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DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Bureau of Water Management  
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Arthur J. Rocque, Jr., Commissioner

## Connecticut Water Quality 2004

Summarized from the  
2004 Water Quality Report to Congress, Prepared Pursuant to Clean Water Act Section 305(b)

### About This Fact Sheet

This fact sheet is a summary of Connecticut's 2004 Water Quality Report to Congress, also known as the 305(b) Report. Section 305(b) of the Federal Clean Water Act (CWA) requires each State to assess the quality of its surface waters every two years. Water quality is assessed in terms of designated uses, such as aquatic life and recreation, which are specified in the State's Water Quality Standards. States submit biennial 305(b) Reports to the U.S. Environmental Protection Agency (US EPA), where the information is compiled into a national water quality inventory. 305(b) water quality assessments are also used to generate the State's list of impaired waters, a requirement of Section 303(d) of the CWA. The 303(d) list identifies priorities for developing Total Maximum Daily Loads (TMDLs), which are pollutant load analyses used to design appropriate management strategies for individual impaired waters.

*This fact sheet and documents discussed herein are available from the CT Department of Environmental Protection's website, [www.dep.state.ct.us](http://www.dep.state.ct.us) (see also page 8, **For More Information**).*

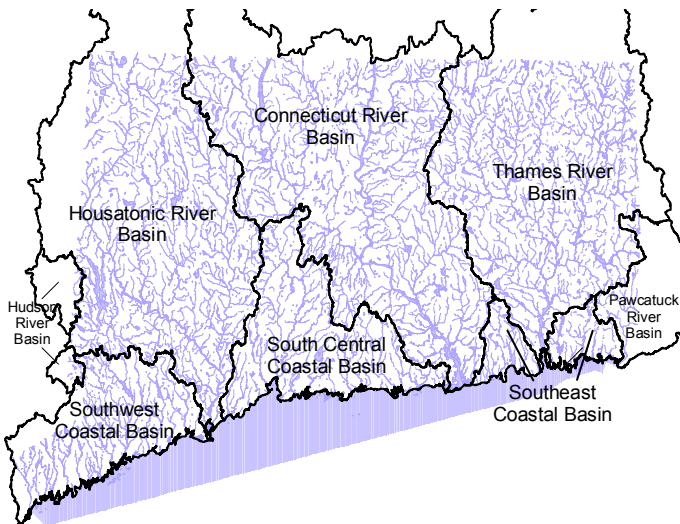
### Connecticut's Water Resources

<u>River miles</u> *	~ 5830
Perennial stream miles	~ 5484
Intermittent stream miles	~ 344
Ditch/canal miles	~ 2
<u>Lakes/Ponds/Reservoirs</u>	~ 2267
Significant Recreational Lakes	~ 116
Drinking Water Reservoirs	179
<u>Wetland acres</u>	~ 452,500
Tidal acres	~ 17,500
Inland freshwater wetland acres	~ 435,000
<u>Miles of Coastline</u>	~ 380
<u>Estuaries/Harbors</u> (sq. mi.)	~ 613

\*Estimates based on 1:100,000 scale mapping.

Surface Waters: Connecticut's surface water resources are distributed throughout seven major basins that drain to Long Island Sound: the Thames River, Pawcatuck River, Connecticut River, Housatonic River, Southeast Coast, South Central Coast and Southwest Coast. The coastal basins are complexes of rivers that drain directly to the Sound. In addition, a very small portion of the state drains to the Hudson River in New York.

Ground Waters: Ground water serves as the drinking water supply for roughly one third of Connecticut's residents. Most public drinking (ground) water is extracted from aquifers in glacial sand and gravel deposits called stratified drift. Most single-family wells and many small community wells tap into fractured bedrock aquifers.



## Information Used to Make Water Quality Assessments

Depending on data availability and the kind of waterbody, any one or combination of the following types of data is used to make water quality assessments:

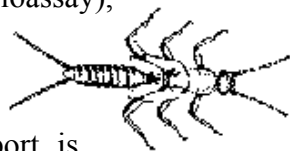
- Physical/Chemical
- Benthic Invertebrate Community
- Fish Community
- Indicator Bacteria
- Aquatic Toxicity (Bioassay)
- Tissue Contaminant
- Sediment Chemistry/Toxicity

The primary sources of monitoring data are the CT Department of Environmental Protection (CT DEP), U.S. Geological Survey (USGS) and the CT Department of Agriculture, Bureau of Aquaculture (CT DA-BA). Information from other state and federal agencies, municipalities, utilities, consultants, academia and volunteer groups is incorporated into assessments where possible.

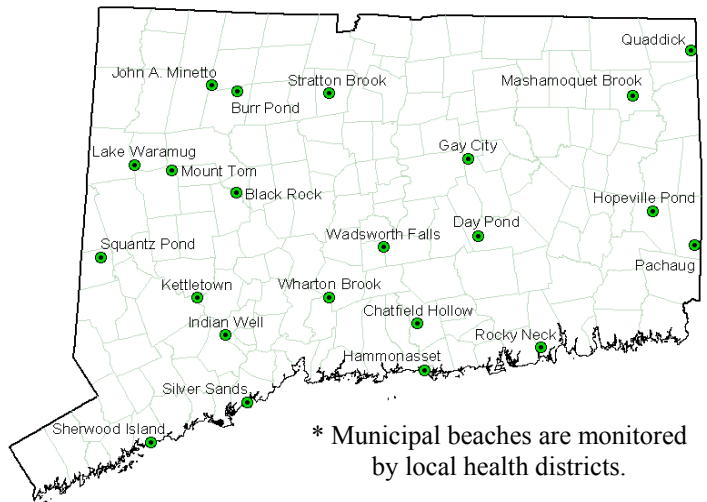
### How Assessments are Made

Water quality is assessed in terms of support of designated uses, such as recreation and aquatic life support, specified in the CT Water Quality Standards. Detailed assessment methodologies are documented in the *CT Consolidated Assessment and Listing Methodology for 305(b) and 303(d) Reporting (CT CALM)*. See page 8, **For More Information**.

**Aquatic Life:** Analysis of the benthic macro-invertebrate community (the assemblage of invertebrates living on, under and between streambed rocks) is the primary means by which aquatic life support is assessed in wadeable streams. This type of community analysis has been used by the CT DEP since the 1970s and is considered a very reliable index of ecological integrity. Analysis of the fish community, water and sediment chemistry, and water and sediment toxicity (bioassay), where appropriate, also contribute to aquatic life use assessments. In estuarine waters, aquatic life use support is largely determined by the presence of hypoxic or low oxygen conditions, which seasonally restrict the ability of estuarine waters to support life.



STATE PARK BEACHES MONITORED BY CT DEP\*



**Recreation:** Enterococci bacteria are used as the main indicator of sanitary quality and support for contact recreation (swimming) in salt waters; *Escherichia coli* is used in fresh waters. Beach closure information, generally based on indicator bacteria, is incorporated into recreation assessments (see above map of monitored State beaches). In lakes, the extent of nuisance aquatic weed growth is also considered in assessing support of swimming and other recreational uses.

**Shellfishing:** Use support for shellfishing in estuarine waters is based on restrictions to shellfishing as determined by the CT DA-BA based on indicator bacteria and sanitary surveys.

**Fish Consumption:** Contaminants in fish tissue and resulting annual consumption advisories issued by the CT DPH are used to determine fish consumption use support.



**Public water supply:** Water utilities report on the quality of water supplies directly to the CT DPH, who in turn, reports to the legislature and public. The 305(b) Report lists the trophic status of all drinking-water reservoirs. 305(b) assessments are conducted for several of these waterbodies that allow recreational uses.

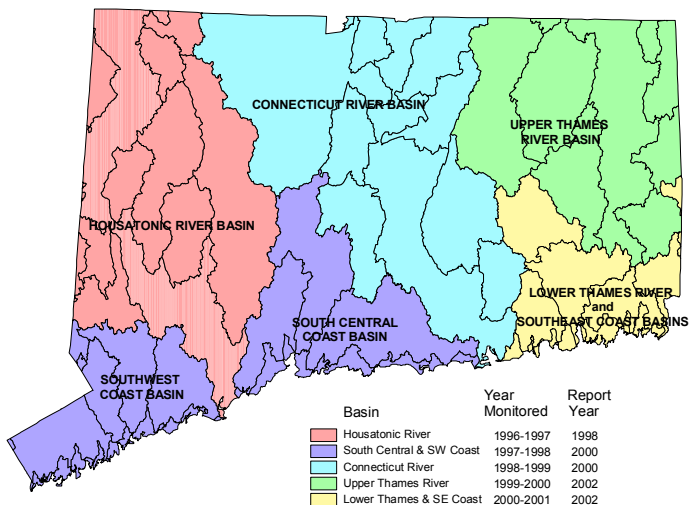
**Other Designated Uses:** Other designated uses of Connecticut surface waters include navigation, industrial and agricultural supply. All State waters are assumed to support these uses.

## Where Water Quality is Monitored

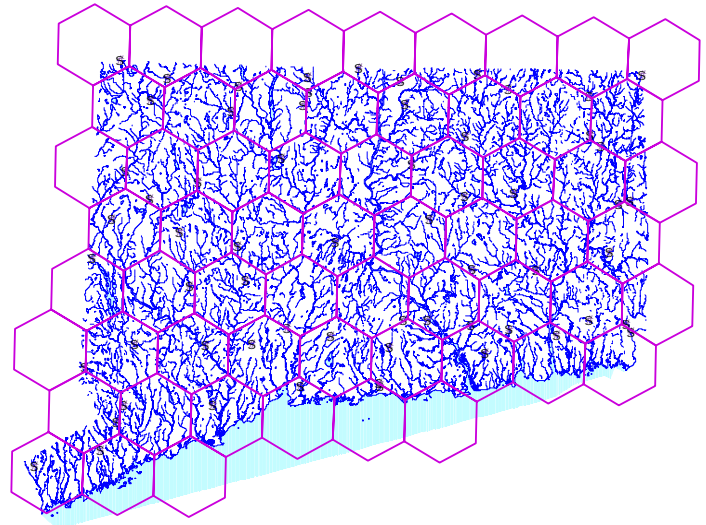
***Waterbodies and Waterbody Segments:*** The basic water quality assessment unit is the waterbody segment. Within a waterbody (e.g., a river, lake, estuary or embayment), each segment is considered to have homogenous water quality (i.e., use support is uniform throughout the segment). Typically, streams are segmented by features that may cause a change in water quality, such as a confluence, a point source discharge, an impoundment or a significant change in land use. For the 2004 reporting cycle, 242 rivers comprising 487 segments were assessed. Almost all 147 assessed lakes were considered to each consist of one segment. (The two exceptions were a large river impoundment partially affected by low oxygen and a pair of connected ponds separated by an earthen berm.) Long Island Sound and associated embayments and estuaries were divided into 51 waterbodies with 112 segments, largely based on shellfish bed classifications.

***Rivers and Streams:*** In 2001, the CT DEP completed statewide monitoring in wadeable streams and rivers using a rotating basin strategy (see map below), which targeted a major hydrological area (basin) for monitoring each year during a five-year cycle. An increased effort was also made to incorporate data from volunteers, academics and municipalities. The resulting increase in assessed miles was from approximately 15% of all perennial river miles to 25%.

### ROTATING BASIN STRATEGY 1996-2001

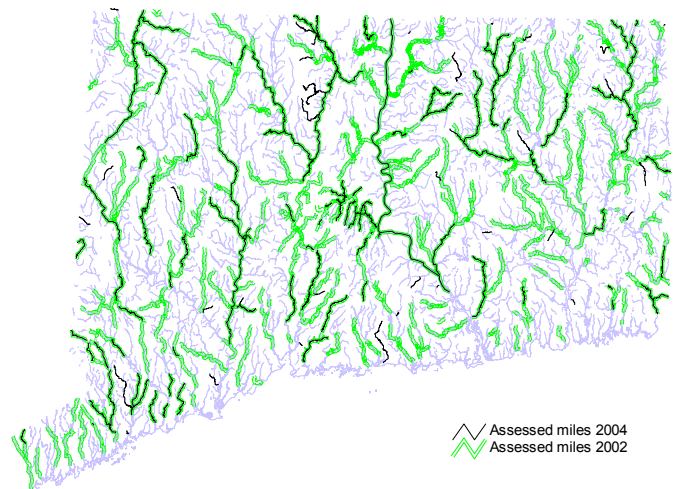


### PROBABILISTIC SITES 2002-2003



While this represented a major increase in assessed river miles, it did not meet the CWA requirement to assess all navigable waters. To work toward this comprehensive assessment goal, the CT DEP, in cooperation with US EPA Region I, conducted a probabilistic monitoring effort during 2002-2003 (see map above), where a statistically valid sample of streams was monitored to represent conditions of all wadeable streams in the State. The full statistical analysis for the probabilistic stream study will not be complete until the 2006 305(b) Report. For the 2004 report, where new data were available (759.5 miles in 173 segments), assessments were made on a segment-by-segment basis. Where no new data were available, river and stream segment assessments remain the same as for the 2002 305(b) Report (see map below).

### RIVERS ASSESSED FOR THE 2004 REPORT



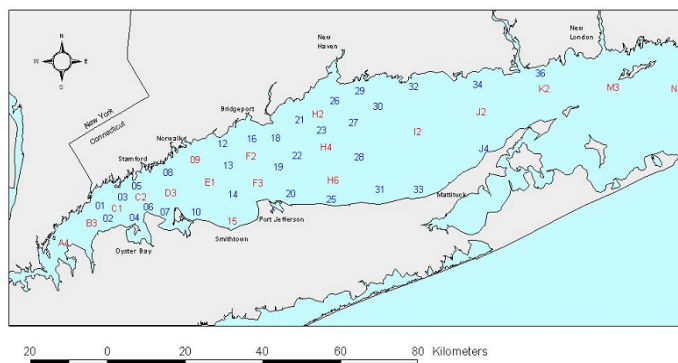


Lakes: Lake assessments, in recent years, have been based largely on data provided in diagnostic studies conducted by contractors. The Lakes Management Grant Program, administered by CT DEP, funds and oversees these studies and follow-up management. Beach monitoring information is considered in assessments as well as targeted monitoring by CT DEP and USGS in lakes with known problems. For the 2004 report, lake assessments were updated for 77 of 147 assessed lakes, where new information was available. In 2005, CT DEP will begin a statewide probabilistic lake-monitoring program similar to probabilistic monitoring done in rivers during 2002 – 2003.

Drinking Water Reservoirs: These impoundments are monitored by their respective water utilities. Water quality data from raw and finished water (treated water ready for distribution) are submitted to the Connecticut Department of Public Health (CT DPH). Additionally, CT DEP surveys water utilities regarding the trophic status of and potential sources of degradation to individual reservoirs.

Estuaries: Long Island Sound is monitored by CT DEP monthly for dissolved oxygen and nutrients at 17 fixed stations; 25 - 30 stations and bi-weekly surveys are added during summer months for

## LONG ISLAND SOUND STATION MAP



dissolved oxygen (see map above). CT DEP collects additional water chemistry, sediment, biological community and tissue data at selected offshore and harbor sites for a US EPA probabilistic monitoring program, the National Coastal Assessment, to statistically represent conditions of the entire Sound. These datasets provide the basis for aquatic life use assessments. Annual shellfish bed monitoring and sanitary surveys conducted by CT DA-BA provide assessment information for shellfish use support. Beach closure information as well as known sources of pollution, such as CSOs, are used to determine primary contact use support. All estuarine waters were re-assessed using the most current information for the 2004 reporting cycle.

## SUMMARY OF WATER QUALITY ASSESSMENTS 2004

Designated Use	Assessed	Full Support	Full Support - Threatened	Partial Support	Not Supporting	Not Attainable
<b>RIVER MILES</b>						
Overall Use Support	1,354.9	543.3	213.6	381.6	209.8	6.6
Aquatic Life Support	1,556.2	992.8	203.6	309.9	43.3	6.6
Fish Consumption <sup>a</sup>	1,773.4	1,644.6	1.3	108.0	19.5	0
Contact Recreation	1,338.4	694.2	231.2	218.1	193.3	2.0
<b>LAKE ACRES</b>						
Overall Use Support	26,249.7	8,132.9	12,644.8	5,309.6	162.4	0
Aquatic Life Support	27,650.1	12,086.6	14,534.1	1,028.8	0.6	0
Fish Consumption <sup>a</sup>	27,870.3	23,737.3	0	4,077.9	55.0	0
Contact Recreation	25,996.9	10,800.3	11,039.4	4,050.4	106.8	0
Other Recreational Uses	25,055.3	15,441.3	7,225.9	2,388.1	0	0
<b>ESTUARY SQUARE MILES</b>						
Overall Use Support	613.4	218.7	1.9	384.6	8.2	0
Aquatic Life Support	613.4	371.3	0.4	240.9	0.8	0
Fish Consumption <sup>a</sup>	613.4	604.1	0	9.3	0	0
Shellfishing	377.6	190.3	0	16.9	170.4	0
Contact Recreation	609.5	571.0	13.2	15.9	9.3	0

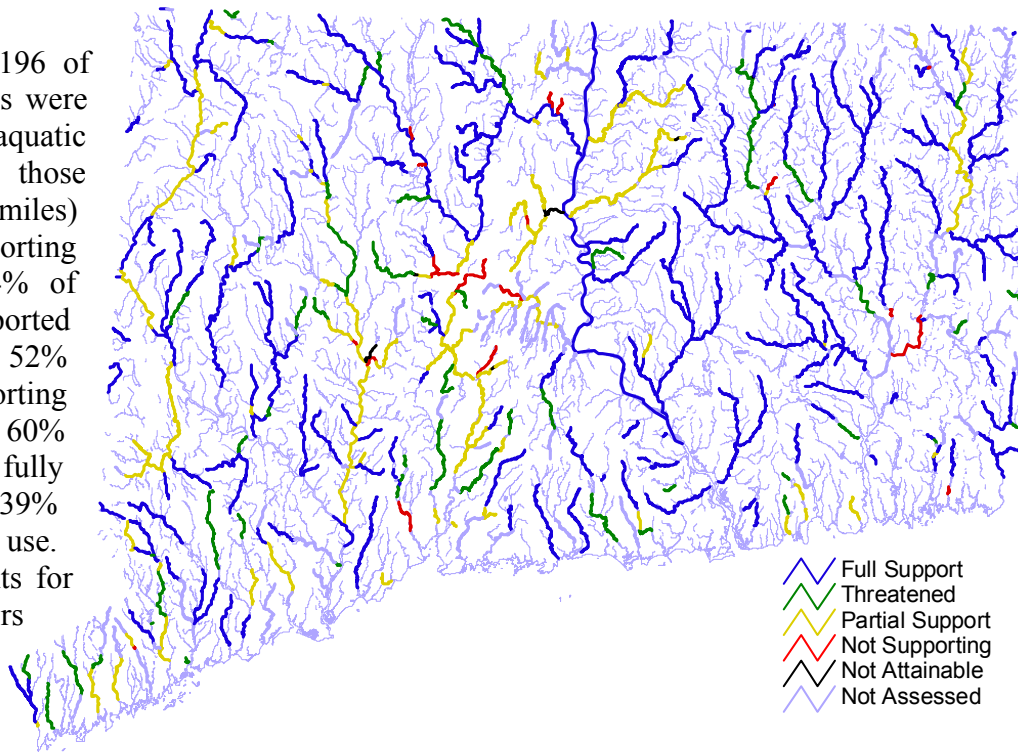
<sup>a</sup> All fresh waters of the State carry a limited consumption advisory for all fish except trout because of mercury contamination from atmospheric deposition, and all estuarine waters carry a limited advisory for bluefish, striped bass and lobster tomalley because of PCB contamination. The waters summarized in this table only consider fish consumption advisories beyond these statewide mercury and PCB advisories.

**USE SUPPORT DEFINITIONS:** *Full Support* - available data indicate the waterbody meets all criteria for a designated use. *Full Support but Threatened* - the waterbody meets criteria, but conditions exist that threaten water quality. *Partial Support* - the waterbody meets criteria part of the time or to a lesser degree than desirable. *Not Supporting* - water quality conditions do not permit a designated use. *Not Attainable* - this designation applies to several miles of river that are completely enclosed in conduit, or where habitat manipulations preclude a use.

## AQUATIC LIFE SUPPORT IN CONNECTICUT RIVERS\*

### Aquatic Life Support

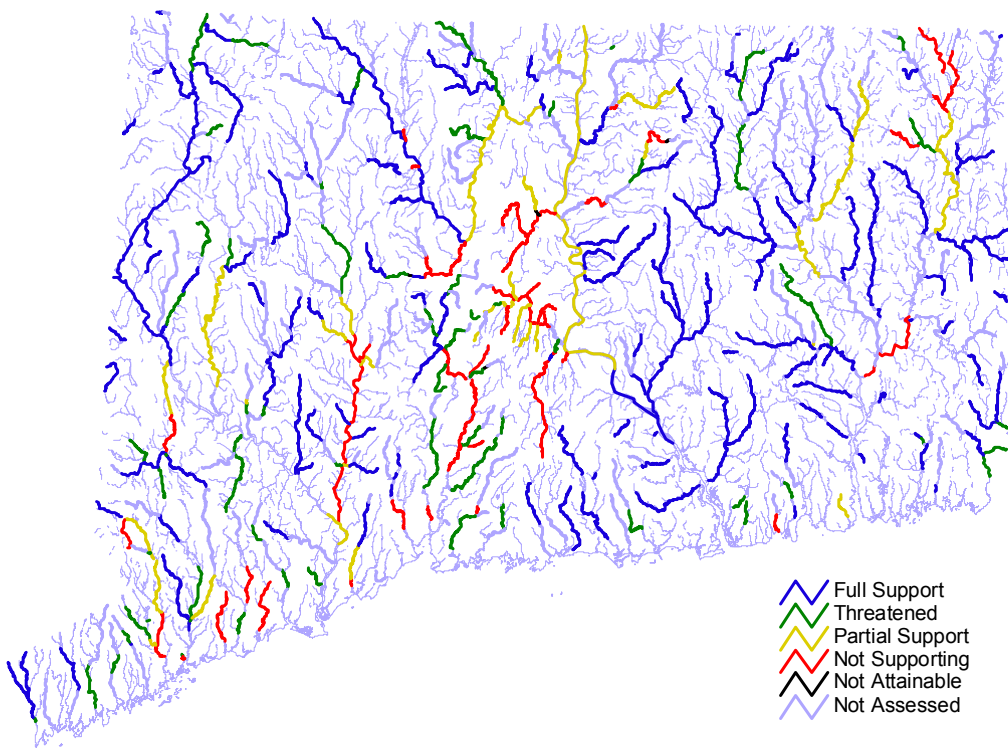
**Rivers:** More than 76% (1,196 of 1,556) of assessed river miles were considered to fully support aquatic life. Seventeen percent of those miles (13% of all assessed miles) were considered fully supporting but threatened. **Lakes:** 44% of assessed lake acres fully supported aquatic life and an additional 52% were assessed as fully supporting but threatened. **Estuaries:** 60% of estuary square miles fully supported aquatic life, and 39% partially supported this use. Seasonal low oxygen accounts for nearly all estuarine waters impaired for this use.



## CONTACT RECREATION SUPPORT IN CONNECTICUT RIVERS\*

### Contact Recreation Support

**Rivers:** 69% of assessed river miles fully supported contact recreation; about one fourth of those miles were considered fully supporting of this use but threatened. **Lakes:** 84% of assessed lake acres were fully supported contact recreation; about one half of these were considered threatened, largely due to nuisance aquatic vegetation. **Estuaries:** Contact recreation was assessed as supported in 96% of estuarine waters. Waters not supporting this use are generally adjacent to remaining CSOs in urban areas.



\* Note: These maps depict freshwater river segments. The lower portions of some rivers (e.g., Connecticut, Thames, Housatonic) appear as Not Assessed on these maps because they were assessed as estuaries.

## Causes and Sources of Impairment

The following tables show commonly identified causes and sources of impairment for Connecticut's assessed waters.

### RIVERS

Potential Cause	Miles affected
Indicator Bacteria	408
Cause Unknown	291
PCBs (fish consumption concern)	125
Siltation	99
Organic enrichment	94
Flow alteration	69
Nutrients	66
Other habitat alterations	44
Metals	32

Potential Source	
Source Unknown	399
Runoff / Storm Sewers	239
Municipal Point Sources	109
Sources outside State borders	105
Dam / Channel / Flow Regulation	105
Industrial Point Sources	99
Combined Sewer Overflows	88
Collection System Failures	72
Agriculture	66



### LAKES

Potential Cause	Acres Affected
PCBs (fish consumption concern)	3,412
Algal Growth	3,285
Nutrients	2,893
Noxious Aquatic Plants	2,249
Exotic Species	2,226
Indicator Bacteria	1,274
Organic Enrichment	897
Mercury (fish consumption concern)	819

Potential Source	
Contaminated Sediments	3,444
Sources outside State borders	3,203
Runoff / Storm Sewers	2,591
Hydro-modification	2,225
Agriculture	2,209
Source Unknown	2,206
Municipal Point Source	2,168
Atmospheric deposition	630

### ESTUARIES

Potential Cause	Square Miles Affected
Low Dissolved Oxygen	237
Nutrients	235
Indicator Bacteria	188
Priority Organics	13

Potential Source	
Runoff / Storm Sewers	382
Municipal Point Sources	343
Atmospheric Deposition (nitrogen)	233
Marinas/boats	193
Waterfowl	176
Combined Sewer Overflows	173

Connecticut's surface water quality has improved significantly over time thanks to a long-term investment in abating pollution from sewage treatment plants and industrial facilities. While further progress will be made through this type of point source control, more attention must be directed to nonpoint source (NPS) and stormwater (SW) pollution management. Sources of NPS/SW pollution include runoff, groundwater leachate and atmospheric deposition. NPS runoff can carry fertilizers that cause algal blooms, soil particles that cloud the water or form deposits over natural substrates, and toxic substances that harm or kill aquatic organisms. Up to 21% of all nitrogen loading to Connecticut's portion of Long Island Sound is estimated to come from atmospheric deposition. In fresh waters, atmosphere-borne mercury bio-accumulates through aquatic food chains, and in large part accounts for the statewide consumption advisory for certain fish species.

The exceedence of indicator bacteria criteria, which affects contact recreation use support, was the most common cause of impairment to rivers. A waterbody was also considered impaired for this use if there was a known sewage collection system leak or CSO, regardless of bacteria levels. In lakes, contact recreation was more often impaired by nuisance aquatic vegetation than bacteria.

When multiple causes and sources of impairment to aquatic life are possible, "cause unknown" and "source unknown" are usually indicated along with the potential causes and sources. Determination of the specific cause(s) generally requires more intensive investigation than is normally conducted during ambient water quality monitoring. Such a study may be undertaken when a waterbody is



targeted for TMDL development. (See also **303(d) Listed Water and TMDLs**).

Exotic species and nuisance aquatic plants are an impairing cause in more than 2,200 lake acres, but they threaten use support in many more. This problem is largely attributable to the transport of vegetation from one lake to another as plant fragments attached to boats and boat trailers.

PCB contamination in fish of the Housatonic River and three of its impoundments, Lakes Lillinonah, Housatonic and Zoar, accounts for most of the lake acres impaired for fish consumption and about 50 miles of river. The contamination results from the movement of PCB-laden sediments from a site in Pittsfield, MA. A major restoration project is in progress at the site to remedy environmental damage and health risks.

In Long Island Sound, the causes and sources of aquatic life use impairment are well understood. Nitrogen loading from sewage treatment plants and NPS/SW causes extensive algal blooms. Harmfully low oxygen conditions (hypoxia) occur when large amounts of these floating microscopic algae die and decompose in bottom waters. A major effort is underway to address this issue (see page 8, **Special State Concerns and Initiatives**).

## D 303(d) Listed Water and TMDLs D

Section 303(d) of the Federal CWA requires each State to prepare a list of waterbodies that do not meet Water Quality Standards (WQS). Beginning in 2002, the Connecticut 303(d) list was generated as a subset of waters assessed for the 305(b) Report, following methods described in the *CT CALM*. Impaired waters are further categorized and prioritized for management in the *2004 Connecticut Waterbodies Not Meeting Water Quality Standards (Impaired Waters List)*. See **For More Information**).

For waters where required point and nonpoint source pollution controls are not stringent enough to meet State WQS, Section 303(d) of the CWA requires the State to develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL defines the greatest amount of a pollutant that a waterbody can receive without exceeding criteria adopted in the State's WQS, and presents a plan to reduce the loading of that pollutant to a level that will restore the beneficial uses of that waterbody.

## CT DEP Water Quality Programs

Connecticut Water Quality Standards (WQS): The WQS provide the overall policy for implementing State statutes and regulations, and describe water quality goals, criteria and classifications for individual resources. Policies set forth in the WQS maintain that the CT DEP shall:

- ◆ Protect waters of high quality from degradation.
- ◆ Segregate waters used for drinking from those that play a role in waste assimilation.
- ◆ Restore and maintain all surface waters at conditions suitable for fish, wildlife and recreation.
- ◆ Restore degraded ground water to protect existing and designated uses.
- ◆ Provide a framework for establishing priorities for pollution control.
- ◆ Adopt standards that promote the State's economy in harmony with the environment.

Permitting of Discharges: The CT DEP regulates wastewater discharges through the issuance, monitoring and enforcement of surface and groundwater discharge permits. Regulated discharges include those from: industrial and power generation facilities, municipal sewage treatment plants, large construction sites, agricultural waste management systems, large subsurface sewage disposal systems, landfills, and groundwater remediation sites.

Enforcement: The CT DEP relies upon a number of enforcement tools to achieve compliance with State and Federal Clean Water Act regulations. Examples include facility monitoring and inspection, notices of violation, compliance assistance, and various types of pollution abatement orders. In severe cases, enforcement may be referred to the State Attorney General for civil violations, or the State Attorney for criminal violations.

Nonpoint Source (NPS) Pollution Control: Management of NPS requires the integration of numerous State, local and Federal programs. Connecticut uses a "networked" approach involving diverse programs such as stormwater and agricultural waste management, local land use planning, aquifer protection, wetland protection and air pollution control. Section 319 of the CWA, administered through the CT DEP, funds a number of education, monitoring and restoration projects aimed at mitigating effects of NPS.

## Special State Concerns and Initiatives

Long Island Sound: In 2001, the US EPA approved a TMDL for Long Island Sound, which formalizes a plan to meet dissolved oxygen goals in bottom waters by the year 2014. This will be accomplished through a reduction of annual nitrogen loading from both CT and New York. CT will reduce the annual load of nitrogen from point sources (based on 1990 baseline loading levels) by 64% and the load from nonpoint sources by 10%. To achieve the point source wasteload reductions, in 2001 the CT General Assembly authorized a Nitrogen Credit Exchange program for 79 sewage treatment plants (STPs). Dischargers that remove more nitrogen than required can sell earned credits to the Exchange. Through this program, the overall nitrogen reduction goal was exceeded in both 2002 and 2003. Future success will depend on continued availability of financing for municipal projects.

Watershed Management: Watershed management considers the resources and problems of a whole drainage basin. Priorities and opportunities are identified within the basin to abate pollution, restore degraded aquatic habitat and protect water resources. In 1999, the CT DEP established basin coordinators for five major hydrological areas in the state (essentially the same areas identified for the rotating basin approach to monitoring). Each basin coordinator serves as the point person for comprehensive watershed management based on sound science, local stewardship and shared management responsibilities with watershed partners.

Stormwater Management: At the present time, almost 2000 facilities in Connecticut are registered under one or more general permits authorizing the discharge of storm water. Over the next several years, these efforts will be expanded, especially in the areas of municipal storm water (Phase II), and discharges from farm animal feeding operations.

Site Remediation: Connecticut's site remediation program is guided by Connecticut's Property Transfer Act, remediation standard regulations, and a "covenant not to sue" program. Urban areas are prioritized through the State's Urban Sites Remedial Action Program and Federal Brownfield's Program. The CT DEP's Potable Water Program provides short and long-term drinking water relief to citizens affected by contaminated wells. See: [www.dep.state.ct.us/wtr/remediation/index.htm](http://www.dep.state.ct.us/wtr/remediation/index.htm).

Aquifer Protection: Over the next few years, Aquifer Protection Areas (APAs) will be designated around 122 well fields in sand and gravel aquifers that provide drinking water to more than 1,000 people. Each town containing an APA will designate an existing commission to regulate land use activity within the APA, based on recently adopted CT DEP regulations that set minimum standards. Such regulations will prohibit development of new high-risk land use activities that use hazardous materials, and require registration and best management practices for existing high risk activities. Water companies that own the affected wells will accurately map protection areas and assist towns in protection. See [www.dep.state.ct.us/wtr/aquiferprotection/index.htm](http://www.dep.state.ct.us/wtr/aquiferprotection/index.htm).

State Water Allocation: CT DEP, as a member of the legislatively established Water Planning Council (WPC), is working to develop a comprehensive State water allocation system that preserves the integrity of water resources while providing for public drinking water needs. In January 2003, the WPC submitted a report to the General Assembly proposing initial action steps and policy changes, and began to address identified issues. This report and other WPC documents are at the WPC website: [www.dpuc.state.ct.us/DPUCINFO.nsf/ByWaterPlanning](http://www.dpuc.state.ct.us/DPUCINFO.nsf/ByWaterPlanning).

## What You Can Do...

- ◆ Dispose of wastes and hazardous materials properly
- ◆ Reduce use of chemical fertilizers and pesticides, especially near waterbodies
- ◆ Keep pet wastes, chemicals, oils and detergents away from storm drains and water resources
- ◆ Report spills, suspicious discharges and water quality problems to the proper authorities (CT DEP Emergency Spill Reporting: 860/424-3338)
- ◆ Get involved in volunteer monitoring, watershed protection and/or local land use decision-making

## For More Information

The CT Water Quality Standards, 305(b) Report, CT CALM, and Impaired Waters List are available at: [www.dep.state.ct.us/wtr/index.htm](http://www.dep.state.ct.us/wtr/index.htm). For information about these documents, water quality monitoring; volunteer monitoring, NPS programs, Long Island Sound studies, and watershed management:

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